**Supplementary File 1. Summary table of statistical analysis conducted throughout the study.**

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| **Figure** | **Condition** | **n** | **Test** | ***P* value** |
| Fig 1a | 6E10+ cell density: 3-month vs. 6-month | 3,*8* vs*.* 3,*8* | Wilcoxon Rank | 0.1027 |
| Fig 1d | VIP+ cell density: VIP-nonTg vs. VIP-TgCR+ cell density: VIP-nonTg vs. VIP-TgVIP+/CR+ cell density: VIP-nonTg vs. VIP-Tg | 3,*17* vs.3,*13*3,*11* vs.3,*11*3,*11* vs.3,*11* | Wilcoxon RankWilcoxon RankWilcoxon Rank | 0.44420.87200.0751 |
| Fig 1 - S1b | RI Sample: VIP-nonTg vs. VIP-TgRI Test: VIP-nonTg vs. VIP-Tg | 10 vs. 1110 vs. 11 | Unpaired t-testUnpaired t-test | 0.83730.0040\*\* |
| Fig 1 - S1c | Total object exploration time (Test): VIP-nonTg vs. VIP-TgTotal horizontal activity (Test): VIP-nonTg vs. VIP-Tg | 10 vs. 1110 vs. 11 | Unpaired t-testUnpaired t-test | 0.14080.0933 |
| Fig 2c | AP amplitude: VIP-nonTg vs. VIP-TgAP half-width: VIP-nonTg vs. VIP-TgAP depolarization rate: VIP-nonTg vs. VIP-TgAP repolarization rate: VIP-nonTg vs. VIP-TgAP area: VIP-nonTg vs. VIP-Tg | 5,8 vs. 3,105,8 vs. 3,105,8 vs. 3,105,8 vs. 3,105,8 vs. 3,10 | LMMLMMLMMLMMLMM | 0.8430.018\*0.4610.024\*0.025\* |
| Fig 2d | AP amplitude: VIP-nonTg vs. VIP-TgAP half-width: VIP-nonTg vs. VIP-TgAP area: VIP-nonTg vs. VIP-Tg | 5,7 vs. 3,75,7 vs. 3,75,7 vs. 3,7 | Two-way ANOVATwo-way ANOVATwo-way ANOVA | <0.0001\*\*\*\*<0.0001\*\*\*\*<0.0001\*\*\*\* |
| Fig 2e | Norm. AP depol. rate: VIP-nonTg vs. VIP-TgNorm. AP repol. rate: VIP-nonTg vs. VIP-Tg | 5,7 vs. 3,75,7 vs. 3,7 | Two-way ANOVATwo-way ANOVA | 0.9998<0.0001\*\*\*\* |
| Fig 2f | AP number: VIP-nonTg vs. VIP-Tg | 5,7 vs. 3,7 | Two-way ANOVA | 0.0264\* |
| Fig 2 - S1c | sIPSC amplitude: VIP-nonTg vs. VIP-TgsIPSC frequency: VIP-nonTg vs. VIP-TgsEPSC amplitude: VIP-nonTg vs. VIP-TgsEPSC frequency: VIP-nonTg vs. VIP-Tg | 5, 7 vs. 5, 65, 7 vs. 5, 65, 5 vs. 4, 45, 5 vs. 4, 4 | Unpaired t-testUnpaired t-testUnpaired t-testUnpaired t-test | 0.46640.33490.29610.5242 |
| Fig 2 - S2b | IS3 soma area: VIP-nonTg vs. VIP-Tg | 5, 6 vs. 4, 5 | Wilcoxon Rank | 0.4818 |
| Fig 2 - S2c | IS3 dend. surface: VIP-nonTg vs. VIP-Tg | 5, 6 vs. 4, 5 | Wilcoxon Rank | 0.3773 |
| Fig 2 - S2d | IS3 dend. length: VIP-nonTg vs. VIP-Tg | 5, 6 vs. 4, 5 | Wilcoxon Rank | 0.3773 |
| Fig 2 - S2e | IS3 dend. branch points: VIP-nonTg vs. VIP-Tg | 5, 6 vs. 4, 5 | Wilcoxon Rank | 0.7258 |
| Fig 2 - S2f | IS3 dend. length vs. distance from soma:VIP-nonTg vs. VIP-TgIS3 dend.number of intersections vs. distance from soma: VIP-nonTg vs. VIP-TgIS3 dend. number of nodes vs. distance from soma: VIP-nonTg vs. VIP-Tg | 5, 5 vs. 4, 55, 5 vs. 4, 55, 5 vs. 4, 5 | Two-way ANOVATwo-way ANOVATwo-way ANOVA | >0.99990.9941>0.9999 |
| Fig 3b | sIPSC amplitude: nonTg vs. TgsIPSC frequency: nonTg vs. Tg | 5, 16 vs. 4, 105, 16 vs. 4, 10 | Wilcoxon RankWilcoxon Rank | 1.00000.0017\*\* |
| Fig 3c | sIPSC rise time: nonTg vs. TgsIPSC decay tau: nonTg vs. TgsIPSC charge transfer: nonTg vs. Tg | 5, 16 vs. 4, 105, 16 vs. 4, 105, 16 vs. 4, 10 | Wilcoxon RankWilcoxon RankWilcoxon Rank | 0.0095\*\*0.0017\*\*0.0214\* |
| Fig 3e | VGAT bouton density: nonTg vs. TgVGAT/CR bouton density: nonTg vs. Tg | 4,*19* vs*.* 4,*21*4,*19* vs*.* 4,*21* | Unpaired t-testWilcoxon Rank | 0.88860.9039 |
| Fig 3 - S1b | sEPSC amplitude: nonTg vs. TgsEPSC frequency: nonTg vs. Tg | 5, 8 vs. 4, 55, 8 vs. 4, 5 | Wilcoxon RankWilcoxon Rank | 0.31850.4789 |
| Fig 3 - S1c | sEPSC rise time: nonTg vs. TgsEPSC decay tau: nonTg vs. TgsEPSC charge transfer: nonTg vs. Tg | 5, 8 vs. 4, 55, 8 vs. 4, 55, 8 vs. 4, 5 | Wilcoxon RankWilcoxon RankUnpaired t-test | 0.67220.77820.4585 |
| Fig 4c | Animal speed: nonTg vs. TgAnimal mobility rate: nonTg vs. TgTotal distance: nonTg vs. TgRearing: nonTg vs. Tg | 13/group13/group13/group9 vs. 7 | Wilcoxon RankWilcoxon RankWilcoxon RankWilcoxon Rank | 0.93980.46370.74320.4990 |
| Fig 4e | Walk AVG Z-score: nonTg vs. TgWalk Peak Z-score: nonTg vs. Tg | 9 vs. 89 vs. 8 | Wilcoxon RankWilcoxon Rank | 0.92540.6732 |
| Fig 4g | Alternation-%: nonTg vs. Tg | 9 vs. 6 | Fisher’s Exact | 0.2517 |
| Fig 4h | nonTg AVG Z-score stem vs. D-zoneTg AVG Z-score stem vs. D-zonenonTg Peak Z-score stem vs. D-zoneTg Peak Z-score stem vs. D-zone | 5555 | Wilcoxon SignedWilcoxon SignedWilcoxon SignedWilcoxon Signed | 0.31250.0313\*0.6250.0313\* |
| Fig 4i | Object entries: nonTg vs. TgObject time: nonTg vs. Tg | 10 vs. 810 vs. 8 | Wilcoxon RankWilcoxon Rank | 0.77000.6676 |
| Fig 4j | Object Sample AVG Z-score: nonTg vs. Tg | 10 vs. 9 | Wilcoxon Rank | 0.0152\* |
| Fig 4 - S1b | Home Cage CaT peak amplitude: nonTg vs. TgHome Cage CaT frequency: nonTg vs. Tg | 9 vs. 89 vs. 8 | Wilcoxon RankWilcoxon Rank | 0.35390.0915 |
| Fig 4 - S1d | Locomotion Z-score: nonTg vs. TgImmobility Z-score: nonTg vs. TgRearing Z-score: nonTg vs. Tg | 9 vs. 89 vs. 89 vs. 8 | Wilcoxon RankWilcoxon RankWilcoxon Rank | 0.42570.87210.2259 |
| Fig 4 - S1e | DZ average speed: nonTg vs. TgDZ average mobility speed: nonTg vs. TgDZ distance traveled: nonTg vs. Tg | 10 vs 510 vs 510 vs 5 | Wilcoxon RankWilcoxon RankWilcoxon Rank | 0.72290.14620.2298 |
| Fig 4 - S1f | Stem average speed: nonTg vs. TgStem average mobility speed: nonTg vs. TgStem distance traveled: nonTg vs. Tg | 10 vs 510 vs 510 vs 5 | Wilcoxon RankWilcoxon RankWilcoxon Rank | 0.63590.22980.6359 |
| Fig 5b | Home Cage CaT peak amplitude: nonTg vs. TgHome Cage CaT frequency: nonTg vs. Tg | 4 vs. 54 vs. 5 | Wilcoxon RankWilcoxon Rank | 0.81660.8166 |
| Fig 5d | Walk Peak Z-score: nonTg vs. TgWalk AUC Z-score: nonTg vs. Tg | 4 vs. 54 vs. 5 | Wilcoxon RankWilcoxon Rank | 0.48320.3464 |
| Fig 5f | nonTg AVG Z-score stem vs. D-zoneTg AVG Z-score stem vs. D-zonenonTg Peak Z-score stem vs. D-zoneTg Peak Z-score stem vs. D-zone | 4545 | Paired t-testWilcoxon SignedPaired t-testWilcoxon Signed | 0.0335\*10.0333\*1 |
| Fig 5h | Object-Zone AVG Z-score: nonTg vs. TgObject-Zone RMS Z-score: nonTg vs. Tg | 4 vs. 54 vs. 5 | Wilcoxon RankWilcoxon Rank | 0.75840.0107\* |